

Thriving or Surviving? Forester Responses to Private Forestland Parcelization in New York State

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Abstract Consulting forester business practices are challenged by significant decreases in the sizes of private forest properties and the changes in landowner values that accompany forestland parcelization. Though researchers have discussed the potential ways entrepreneurial foresters could adapt to these new ownership patterns and landscape dynamics, actual responses by foresters working in parcelizing landscapes are largely undocumented. We conducted twenty in-depth interviews with foresters working in New York State to determine (1) how foresters have experienced parcelization of properties they work with, (2) what challenges are associated with forestry projects on decreasing property sizes, and (3) what kinds of changes foresters are making to adapt to decreasing property sizes. We found that foresters across the state observe decreasing sizes of forest properties and see values of forest owners shifting beyond timber production, although most do not consider these changes to be the most urgent challenges to sustainable forestry and profitable forest consulting. Professional foresters are reacting to parcelization in diverse ways; while some are trying entrepreneurial approaches to reach new clients or offer different services, others are primarily interested in maintaining their traditional practices and roles. These findings indicate that strictly relying on independent entrepreneurial responses by private foresters may not be sufficient to close the gap between the historical role of consulting foresters and the trajectory of modern forest parcels. Additional measures like specialized training and policy changes may also be required to address the management challenges associated with forestland parcelization.

Keywords Foresters · Private landowners · Small business entrepreneurs · Parcelization

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Introduction

Private ownership makes up the majority of many forested landscapes in the US and owners have a diverse set of motivations and objectives for their forest properties (Bliss and Martin 1989; Butler 2008). For many private forest owners, advice and activities provided by natural resource managers improves forest health and ecological services while producing long-term sources of income for the owners (Henly et al. 1990; Hull and Nelson 2011). However, the ongoing process of parcelization has divided many large single ownership forest tracts into smaller parcels with diverse ownerships, often preceding increased forest habitat fragmentation (Haines et al. 2011), as well as development and a reduction in forest area (Best and Wayburn 2001). As a result of this fractured landscape, the forestry community has been challenged to find new ways to help private landowners manage small properties in order to maintain healthy and viable forests (Sampson and DeCoster 2000).

There is increasing consensus that the forest products industry and the forestry profession must be realigned to the declining size of forest parcels and focus on the majority of landowners who value their forests for reasons other than timber production (Germain et al. 2006; Hull 2011). However, little is known about how foresters perceive the changes associated with forest parcelization and whether they are adapting their business practices in response to new owners and smaller forest properties. The purpose of this study is to explore how parcelization of forest properties affects the practices of professional foresters working with private landowners in New York State. To do so we examined forester responses to the following research questions:

1. Are foresters experiencing parcelization in the areas in which they work?
2. What are the challenges associated with forestry projects on divided properties?
3. What changes are foresters making to their consulting practices in order to adapt to smaller property sizes?

By employing qualitative inquiry into the perspectives of foresters from diverse employment sectors, we were able to explore broad-scale changes in the management of private forestland due to parcelization and the reactions of forest resource professionals to these changing conditions.

Forest Parcelization

Across the US privately owned forest properties are being divided into smaller acreages and transferred through the process of parcelization (Birch 1996; DeCoster 1998; Butler and Leatherberry 2004). New York State is no exception to this pattern, where an increasing number of forest properties in smaller ownerships have been documented in several counties (Germain et al. 2006; Lapierre and Germain 2005). According to the 2006 National Woodland Owner Survey, nearly 65 % of New York State forestland is now owned in properties of less than 100 acres, and over 40 % of forest acreage is divided into properties of less than 50 acres.

Additionally, 88 % of all woodland owners in New York own less than 49 acres of woodland (Butler et al. 2011).

Parcelization results in smaller properties, reduced capacity, increases the number of owners, and makes forest management activities less economically feasible (Row 1978). In parts of the northeastern United States, rising land values and property taxes have made it nearly impossible for landowners to pay property taxes from timber revenue alone (D'Amato et al. 2010) and in New York State, management for a continuous supply of income-producing timber becomes extremely unlikely when forested properties drop to sizes below 30 acres (Vickery et al. 2009). In addition, the process of organized subdivision for the construction of multiple residences may be accompanied by heavy or premature harvests of valuable timber species, often referred to as “liquidation cuts” or a form of “high-grading”, reducing overall timber quality and significantly limiting management options for the subsequent owners (Germain et al. 2007, p. 406).

The Role of Professional Foresters

Many landowners are interested in improving their forests (Hull et al. 2004). However, when they decide to take on forest management projects, they often have little knowledge of appropriate techniques, so they turn to a variety of information sources (Sagor 2006; Broussard et al. 2008a). Foresters are one of the primary sources of professional land management advice to forest owners (Butler 2008). The ability to have one-on-one access to a professional forester to “walk the land” and discuss economic issues, management alternatives, and personalized advice is one of the most important types of assistance that can be provided to family forest owners (Toivonen et al. 2005; Kilgore et al. 2007). The benefits of forestry assistance to landowners include higher payments for timber, healthier residual stands, and increased tree regeneration (Hubbard and Abt 1989; Henly et al. 1990).

Despite these advantages, less than 20 % of New York forest owners have sought any kind of professional forester advice for activities beyond forest product harvesting or management (Broussard et al. 2008a). New York foresters provide management advice to private landowners either through independent private consulting, as members of multi-state consulting and land management firms, with state and federal agencies (primarily the New York State Department of Environmental Conservation (NYS DEC)), or as industrial foresters who, in some cases, work with private landowners to procure timber for their companies. Owners are most likely to involve foresters when conducting management activities such as harvesting sawlogs, firewood, and non-timber forest products for sale, but professional involvement has been much lower for other operations, including improving wildlife habitat and scenic values and conducting road or trail maintenance (Broussard et al. 2008b). Although they do not work with a large proportion of private forest owners, individual foresters work directly with a number of owners across moderately-sized landscapes and they are knowledgeable about the dynamics of local forest ownership and current methods of management. As a result, foresters have detailed knowledge about local social, economic, and ecological

conditions that can provide a valuable perspective for understanding broad patterns of change across forested landscapes (e.g. Knoot et al. 2009).

Working in an Increasingly Parcelized Landscape

In the last 15 years, researchers have posited several approaches that foresters can adopt for working in an increasingly parcelized landscape. One potential solution to difficulties created by smaller properties has been to combine projects on neighboring properties, eliminating the constraining effects of property boundaries and providing timber management benefits to multiple small landowners, similar to those enjoyed by large landowners. This coordination can increase timber volume and minimize the difficulty and expense of moving equipment and labor (Hull et al. 2004; Kittredge 2005). In surveying foresters in Wisconsin, Rickenbach and Steele (2006) found that 65 % had coordinated cross-boundary forestry practices for forest owners in the previous 2 years and that over 90 % were likely to do so again. However, over a third of these foresters responded that they had not taken on cross-boundary projects because they or their clients had no interest, foresters believed it would take too much time or be unprofitable, or they were simply unsure of how to do so (Rickenbach and Steele 2006). Only a relatively small segment of private forest owners have expressed interest in developing these cooperative planning and management strategies (Kittredge 2005; Broussard Allred et al. 2010). Furthermore, even if owners share similar problems and needs, it is not easy to establish forest owner cooperatives (Nonic et al. 2011).

Another strategy for foresters working on small parcels is incorporating landscaping principles into existing forest management practices in order to enhance natural beauty, wildlife habitat, and recreational opportunities of small forest properties (Tyson et al. 1998). There is international recognition that traditional forestry, with its emphasis on timber production, is adapted to include management for multiple uses that provide social, environmental and economic benefits together (Urquhart et al. 2010). To provide a wider range of benefits, Hull et al. (2004) recommended that foresters collaborate with other professions (such as landscapers and arborists), consider forest management practices beyond traditional timber production, develop new methods of reaching small landowners and shift away from fee structures tied only to the value of harvested timber.

There is consensus that many primary producers, including foresters, are seeking new ways of making a living in response to restructuring of rural land ownership and owner objectives (Ilbery 1998). Hull and Nelson (2011) recently found that some private forestry-service providers working on small and suburban woodlots in Virginia and several other states are adapting to increasing urbanization by using diversified and adaptable management practices, increased networking and referrals with each other, adding value to forest products, and incorporating terminology on sustainability, stewardship, and amenities in their marketing and communications. However, little research has been conducted concerning foresters' entrepreneurial traits and their abilities to make changes in responses to changing conditions (Niskanen et al. 2007).

Small Business Reactions to Change

Private forestry consultants have traditionally operated as sole, independent proprietors of their businesses (Field 1986) and nearly all consulting foresters work for organizations with employee numbers that qualify as small businesses (Headd 2000). A key determinant of the competitive advantage and organizational survival of any business is its ability to cope with changing contextual forces (D'Aveni and Gunther 1994). Forest parcelization does not occur as a single event, but as a gradual change across a landscape. The ongoing parcelization of forestland reduces property sizes, and leads to new forest owners with less ownership experience. If parcelization creates only minor instability in landowner demand for traditional forestry and a fragmented resource base, it should gradually lead to small, continuous adaptations by foresters that emerge from local improvisation and learning (Greenwood and Hinings 1996; Plowman et al. 2007).

Small businesses, such as forestry consultancies, have several qualities that allow them to adapt to changing environmental conditions. Keeble (1992) showed that the ability of small service firms to compete effectively was dependent on greater flexibility to take on different types of projects. In addition, greater independence in setting business goals, methods of production, and hours and conditions of their work can lead to multiple advantages in the marketplace, including the motivation and commitment to make the business succeed, greater flexibility and capacity for customization, unique competencies, and original initiatives (Nooteboom 1994). Furthermore, small localized firms are able to provide tailored services to customers in their geographic area and adapt to fit the needs of the changing market by specializing in their services (Hillman 2003). As parcelization creates smaller forest properties with owners increasingly interested in management for objectives beyond timber production, successful forestry businesses may be able to take advantage of their small size and personal relationships with landowners by focusing on specialized projects tailored to landowner objectives.

However, the characteristics of small businesses can also contribute to weaknesses in a competitive marketplace. These challenges may include limited expertise to take on new types of projects, the inability to take on large projects and capitalize on irregular economies of increased scale, the inability to spread financial risk if individual projects do not prove profitable, and inefficient marketing of services (Nooteboom 1994). In their study of forestry organizations and forestry service providers working on small forest acreages, Hull et al. (2004) found that foresters are also limited by a lack of contractors and suitable equipment to implement management recommendations on small forest tracts and therefore argued that foresters will have to develop new practices to address these challenges. If parcelization creates more small forest tracts and diverse ownership objectives, independent consulting forestry businesses may have difficulty providing a wider variety of specialized services to landowners.

In addition to the challenges of offering specialized services to landowners, foresters may also encounter difficulties marketing services to clients with small, divided parcels. Most private consulting forester business has traditionally been acquired through referrals from other landowners, public foresters, and industry

foresters (Field 1986) and advertising was not generally a factor in creating new projects (Walsh 1986). Hull and Nelson (2011) found that a group of successful forestry entrepreneurs were engaging in creative marketing with new messages and using new media (e.g. promoting “sustainability” and “green” services, using the Internet to reach customers). While some forestry service providers may be filling niches created by urbanization and forest fragmentation, they may have to use additional time or resources to develop new marketing and communications techniques.

A recent study in Canada (St-Jean et al. 2010) revealed that there are two distinct business orientations employed by small and medium-size forestry enterprises; these business distinctions may be equally applicable to foresters working with private forest owners in the United States. St-Jean et al. (2010) showed that while about 80 % of forestry enterprises were primarily concerned with their continued existence and were not very diversified, the remaining 20 % were pursuing growth and taking on additional risks. These two small business philosophies have been termed “small business orientations” and “entrepreneurial orientations” (Stewart and Roth 2001; Runyan et al. 2008). Owners with a small business orientation often view their business as an extension of their personality and use it to fulfill both short and long-term personal goals, in addition to generating income (Carland et al. 1984). Such firms are generally content to remain small in size and to act as a stable presence in the marketplace (Headd 2000). In contrast, an entrepreneurial orientation is distinguished by autonomy, innovativeness, risk-taking, pro-activeness, and competitive aggressiveness (Lumpkin and Dess 1996). In many economic sectors, small business owners are more likely to hold a small business orientation than an entrepreneurial orientation (Stewart et al. 1999; Stewart and Roth 2001). However, firms that adopt an entrepreneurial orientation, especially younger firms and firms with reduced access to capital, may significantly enhance their financial performance (Wiklund and Shepherd 2005; Rauch et al. 2009).

As parcelization continues in many parts of the United States, the economic success and relevancy of consulting foresters will depend on the strategies they pursue to engage to owners of small private forests. This paper is an attempt to describe the extent and nature of challenges posed by parcelization to forestry in New York State and explore whether there is an emergence of entrepreneurial approaches or reliance on traditional small business approaches.

Methods

To gain an in-depth understanding of foresters’ experiences working with private landowners across New York State, we used qualitative research methods. Semi-structured interviews were conducted with active foresters who work with private landowners, including private consulting foresters, industrial foresters, and public foresters. Active forester participation was solicited through email lists of the state chapter of the Society of American Foresters and the Cooperating Forester List maintained by the NYSDEC. The recruiting message specifically requested feedback from foresters working with “small-scale” forestry projects in the State.

All responding foresters were interviewed ($n = 20$). In New York State there are about 250 individuals employed as foresters who provide management advice to private landowners (US Bureau of Labor Statistics 2011).

The lead author conducted 20 in-depth, semi-structured interviews between April and August of 2010. Most interviews ($n = 18$) were conducted by phone due to participant availability, although 2 respondents allowed themselves to be interviewed at private landowner project sites. Interviews averaged 46 min and ranged between 28 and 129 min in length. Each interview followed a similar, open-ended question format. Interview questions and associated clarifying/probing questions included:

- What are the sizes of the private properties you work with? (Probing questions: What is the distribution of the sizes? Has this changed over the last 10 years?)
- What type of forest management work are you involved in? (Probing questions: Have your forest management activities changed over the last 10 years? Can you describe some of your recent projects?)
- Have you seen differences in owner objectives based on their parcel size? (Probing questions: How do you determine what objectives the forest owners have? Have you worked with clients that have recently purchased land or are planning to sell their land? How did this affect their management options and objectives?)
- Have you had to change the way you do business to adapt to smaller parcel size? (Probing questions: What kind of changes have you made? How do you make it economically feasible to work on small woodlots when the harvest volume is small?)

For the purposes of the interviews, we allowed foresters to provide their own definition of “small-scale forestry.” All of the interviews were recorded with a digital voice recorder and transcribed for analysis. Interviews were coded and initial themes were developed using an “open coding” process (Strauss and Corbin 1990) using Atlas.ti version 6.2. Codes were developed based on concepts related to private property parcelization and forester practices. The initial codes were combined, and refined to develop themes and categories of themes.

Qualitative inquiry was chosen to explore the subject of the effects of parcelization from the perspective of the individual foresters directly experiencing it. When little is known about a topic, qualitative information can provide insights into activities and processes (Strauss and Corbin 1990). An inductive approach can yield nuanced information from the perspectives of informants sharing their own experiences (Patton 2002). While all questions were answered by participants, phenomena that were mentioned less frequently still offer important insights about forester reactions to private forestland parcelization. To offer readers a sense of the strength of the agreement among the interviewees, the number of interviewees that shared a particular perspective has been provided for some topics. In addition to shared viewpoints, divergent and unique perspectives and insights are also noted. The research was conducted under a university approved Human Subjects protocol.

Informants and Their Working Contexts

The twenty responding foresters had diverse backgrounds in forestry operations. Interviewees had a combined experience across all nine of the geographic regions of the state established by NYS DEC. Two of the respondents worked for NYS DEC, two worked for large consulting forestry firms with offices in several states, one worked for a large industrial company that produced timber from privately owned land as well as its own properties, one worked for an arboriculture company, and the other fourteen worked as consultants independently or in businesses that employed less than a half-dozen people. Of the fourteen independent and small firm foresters, two concurrently held other jobs in addition to being a consulting forester, three mentioned previous experience working as a logger, two had worked for industrial forestry companies at an earlier point in their careers, and two had worked for NYS DEC in the past.

While all of the foresters were responding to a request to speak with foresters engaged in “small-scale forestry,” their projects ranged in size from those less than an acre to over a thousand acres in size. The majority of their recent projects were on properties with areas between 10 and 500 acres. The services provided by the private consulting foresters interviewed included writing forest management plans, marking timber, conducting and supervising timber harvesting projects, thinning and timber stand improvement projects, posting boundaries, controlling invasive species, conducting timber appraisals for landowners and insurance companies, and monitoring for forest certification. The industrial forester conducted forest inventories, marked timber for harvest, administered logging crews, and identified private properties to purchase for forest management activities while the arborist’s projects involved single tree pruning and removals, wood chipping, and making forest inventory plans. The state foresters were both involved in writing stewardship plans for private properties and working with other foresters to supervise implementation of the state forest tax law program.

Findings

Perceptions of Parcelization

All of the foresters interviewed believed that parcelization of forest properties was occurring to some extent in the areas where they worked. The majority said these changes are noticeably affecting the sizes of properties they work on (16 out of 20), as expressed succinctly by one forester:

I tried to maintain my business, but throughout the years all the jobs kept getting smaller. (Independent consulting forester, now working another job part-time)

Only a small number of foresters (3 out of 20) mentioned working with any landowners that had purchased neighboring properties for consolidation into larger forest parcels or who were managing multiple forest properties. Overall, the trend

toward smaller management units dominated perceptions of parcel change. Most of the foresters interviewed believed that forestland parcelization would continue over the next decade (18 out of 20), though several of them (6 out of these 18) thought that the overall rate of parcel size decreases would slow in the future, primarily because of slowing residential demand. However, nearly all agreed that parcelization is a major challenge to the forestry business:

I think in general we're seeing a lot of parcelization, and I think that's a risk to our forestry service and forest industry. (Independent consulting forester)

Foresters also described ongoing changes in landowner values that they had observed in conjunction with changes in forest property size. They believed that in many areas landowners were purchasing forestland for reasons other than timber income production (e.g. for scenery, second home development, and recreation) and that owners could fulfill those objectives with smaller properties. Respondents said that in the eastern part of New York State, these properties were usually purchased as part of a primary or secondary residence, or as an investment based on increasing property values. In the central and western parts of the state, foresters reported that people's motivations for buying forested properties were more evenly split between residential use and hunting or recreational use. Respondents perceived increasing values for the aesthetic, recreational, and wildlife characteristics of these properties rather than timber production value. They also believed that ownership turnover resulted in landowners with less knowledge about forest succession and less experience with or acceptance of forest management activities.

Besides parcelization, foresters expressed concern about several other issues, including economic and biological threats. Though its role is more indirect, parcelization was recognized as influencing some of these primary concerns. For example, "high-grading", or the practice of exploitative and unsustainable harvesting of large, valuable trees, was recognized as a reaction to the same pressures driving landowners to parcelize, as well as a result of previous parcelization and reduced forest management options. Increasing numbers of landowners and forest fragmentation were linked to invasive insects currently threatening several tree species in the state, as well as reduced regeneration of tree species due to increasing browse pressure by high deer populations. Furthermore, successful management responses to these threats were seen as becoming less likely due to the greater number of owners created by parcelization. Overall, there is certainly a suite of factors affecting forests, which is exacerbated by property parcelization, resulting in complex challenges to foresters working on small parcels.

Challenges in Working with Small Properties

Forester interviewees mentioned multiple challenges of working on parcelized forest properties (Table 1). These challenges can be grouped into the broad categories of (1) multiple small projects replacing fewer large ones, (2) access issues on smaller properties, (3) limited forest stand composition, (4) reduced feasibility for logging contractors, and (5) exclusion from tax incentive programs.

Table 1 Challenges associated with working on small forest properties

Challenges	Interviewees that discussed the issue (n)	Associated concerns	Example quotation
Travel/moving costs for foresters and harvester	11	Increasing fuel costs and reduced profit margins; Results in longer time needed for projects and extra charges to landowners.	"It's very hard for us to get someone into do the work because just the moving of their equipment is so expensive that there isn't much to be made there that's in the timber." (<i>State forester</i>)
Difficulty finding harvesting contractors willing to do small projects	10	Fewer logging contractors available; Some contractors seem to be biased against small projects.	"You know a lot of times I've put out bids for you know open bids and I won't even have any response from them, just because it's lower quality and the size it's just, it'll actually cost them money to come harvest it." (<i>Part-time independent consulting forester</i>)
Declining timber quality	10	Lack of management and little regeneration; Decreasing timber prices.	"For the industry you know the resource has to come from somewhere and I think there's less of it available. Certainly there's less managed resource available and less quality available." (<i>Industrial firm forester</i>)
Inability of properties under 50 acres to qualify for NY State 480-A Forest Tax Law	10	Few incentives to practice forestry; Zoning regulations, especially in Adirondacks, have created large number of forest properties just under size threshold.	"I've worked with some people who wanted to get into 480-A, but didn't have enough qualifying timberland so they didn't do it." (<i>State forester</i>)
Reduced timber volume and no economies of scale	5	Overharvesting and high-grading.	"Since we have the ability to do some of the work ourselves, scale isn't as much of an issue, but to try to put together a commercially viable project would be difficult." (<i>Industrial firm forester</i>)
Not enough room for log landings	6	Challenges aesthetic desires of landowners; Makes it harder to find harvesting contractors.	"Usually you don't want a large landing so it limits you down to smaller contractors." (<i>Large firm consulting forester</i>)
Limited access for timber harvest	6	Leads to difficulties working with neighbors and within environmental regulations.	"The land broken up into many parcels makes it much tougher to get to the trees." (<i>Industrial firm forester</i>)

Table 1 continued

Challenges	Interviewees that discussed the issue (n)	Associated concerns	Example quotation
Increased number of contracts and paperwork	4	Increases the amount of time to do individual projects and makes trying to put together a number of projects substantially more difficult.	“When your properties keep getting smaller, instead of one contract on one property now you have two contracts ... Everything is compounded as the woodlots get smaller.” <i>(Independent consulting forester)</i>
Lack of timber stand diversity	2	Results in fewer options for timber cutting rotations and providing regular income.	“[Smaller landowners] don’t have as much diversity on the landscape so that there’s not as many things that they can do.” <i>(State Forester)</i>

Multiple Small Projects Replacing Fewer Large Ones

The challenges cited most were inherent to the logistics of working on multiple smaller properties instead of fewer large ones. These concerns included increased time and fuel expenses needed for foresters to travel to different properties in order to meet with landowners, carry out marking and planning activities, and oversee management operations. Increased travel distances also contributed to increasing costs and time necessary for moving harvesting equipment for the logging contractors who carry out most management activities. Furthermore, working with more landowners increases the amount of time needed to work out each owner's objectives for their property and construct plans and contracts for forest management projects.

Access Issues on Smaller Properties

Another group of major challenges to practicing forestry on small properties related to the physical limitations of small properties. Smaller properties often have limited or no access to roads to bring in equipment needed in harvesting operations. In addition, foresters working on small properties noted that they were more likely to be limited by regulations that prevented making roads on steep grades and crossing streams or wetlands since smaller properties have fewer alternative routes. Furthermore, small properties limit the locations available for landings—the cleared, level areas necessary for gathering, sorting, and loading logs for transport. Adequate landings were often incompatible with landowner aesthetic objectives, especially on smaller residential parcels where they were more likely to be visible from frequently used areas.

Limited Forest Stand Composition

Foresters also described a set of challenges relating to the characteristics of forest resources found on small properties. For example, several foresters noted that smaller properties generally had less diversity of tree species and ages, which made it difficult to do rotational cuts in different stands at regular intervals. As a result, implementing management projects that would provide regular harvesting returns to landowners required implementing stand rotation periods in ways that did not fit landowner timeframes or objectives. Many foresters stated that the ability to do financially viable projects on small properties was highly dependent on the quality of available timber at the site. Higher quality timber in New York State is generally produced by large hardwood species, especially black cherry (*Prunus serotina*), hard or sugar maple (*Acer saccharum*), and red or white oak trees (*Quercus* sp.). Low quality species, such as pine (*Pinus* sp.) and beech (*Fagus grandifolia*), require higher volumes that were generally not available on smaller properties. If the quality of timber was high then the total volume and size of the property mattered much less, and several foresters remarked that harvesting high-value trees on properties between one and five acres could be profitable. However, most foresters said that the availability of higher quality timber was declining on most of the properties they

worked with. While some foresters conducted forest thinning and timber stand improvement cuts, they noted that many small property owners were not interested in investing money into improving their forestland by increasing the growth of higher value species through intermediate forest treatments. The general decline in timber quality and value is seen as a major obstacle in conducting management activities on small properties and the lack of investment in the future growth of hardwood species perpetuates this challenge.

Reduced Feasibility for Logging Contractors

Furthermore, foresters frequently mentioned having difficulty finding harvesting contractors willing to work on small projects. Nearly half of the foresters interviewed mentioned projects being delayed or cancelled because logging contractors were not available or did not respond to bid solicitations for projects on small properties. A small number of foresters perceived this to be a bias against small-scale projects by logging contractors. However most agreed that it was more likely due to an increasingly difficult financial situation for their logging colleagues. One forester described cases where forest owners were willing to pay out-of-pocket for planning small management projects, but financial returns were insufficient to attract logging contractors who needed to cover the costs of their own expenses. Several foresters mentioned that restrictions on logging contractors had been exacerbated by regulations on heavy trucks, such as those used for moving timber, enacted in areas with larger residential populations and smaller properties. In addition, a decreasing pool of logging contractors and declining number of young people entering the logging business added to concerns about future contractor availability for small property harvesting projects.

Exclusion from Tax Incentive Programs

Several foresters also believed that the lack of state-sponsored tax incentives for small property owners was a major impediment to involving them in forest management activities. The primary state tax incentive program for forest lands is section 480-a of New York State's 1974 Real Property Tax Law, which grants tax reductions for qualifying forest land that consists of at least 50 contiguous acres. Beyond this program, there are few tax incentives for forest owners with less than 50 acres to keep their properties in forest production, although sustainable forest management can occur on properties smaller than this threshold. For many landowners, hiring a consulting forester to create the forest management plan that is required to receive benefits from the 480-A tax program is often a first step towards understanding the status and possibilities of their own forest and conducting future management activities. Because of the 50 acre minimum size threshold, there may be no incentive for smaller landowners to initiate this process.

Table 2 Orientation of consulting forestry services for landowner objectives beyond timber production

Activities	Example quotation
Managing for multiple forest uses	“I do see an intensification of and a variety of interests. You know people want to do more. Whereas before you know when, I first came here, people had these woodlots that they never went to.” (<i>Independent consulting forester, former industrial forester</i>)
Managing to improve forest aesthetics	“Usually if it’s a smaller woodlot, it’s a higher end place that they’re living in, they want a very nice quality job done. Like tops lopped and maybe some stuff chipped along the edge that they can look into it and see.” (<i>Independent consulting forester</i>)
Managing for improved wildlife habitat	“I try to consider wildlife, I mean as far as leaving snags, creating edge. Try to explain to them that you know the forest isn’t just the trees, it’s the whole ecosystem.” (<i>Independent consulting forester</i>)
Managing for recreational improvements	“Some of the advice I give now is when they’re laying out their trails for their timber sale, incorporating that in with the portions of the property that they’d like to access.” (<i>Independent consulting forester, former logger</i>)
Providing landowners opportunities to do part of management work themselves	“[Landowners] have the attitude of, I’m going to do it myself- which is good. That way landowners want to take the initiative and work on their property, and we’re really focused on assisting them in doing that.” (<i>Independent consulting forester</i>)
Providing timber revenue as a mechanism for achieving objectives	“They’re looking at generating income to help them with some of their projects on their property...They’re interested in getting income to use for other projects which are related to the property usually.” (<i>Independent consulting forester, retired state forester</i>)
Developing new tools to connect with landowners	“I took a course on birds in forest settings- which birds like which type of forest settings, how can you manage silviculture and bird populations at the same time. It was really interesting. You realize that it’s just another tool and it’s probably a very good one to talk to landowners about, that a lot of them are interested in birds.” (<i>Independent consulting forester</i>)

Changes in Forester Approach

Despite the major challenges created by decreasing forest property sizes, several interviewees expressed optimism toward working with owners of smaller forest properties. Some respondents believed that the increasing number of smaller properties that cannot be served by larger or industrial forest companies is creating potential opportunities, or market niches. Several of the foresters mentioned changing their business approaches to accommodate owners with smaller parcel sizes and non-timber motivations. These changes fall into two major categories: (1) orientation of services to landowner values (Table 2) and (2) structural changes to increase their capacity to take on small projects (Table 3).

Table 3 Entrepreneurial actions of foresters working on small forest parcels

Actions	Example quotation
Basing payment on fixed or hourly rates instead of commissions on timber sales.	“I don’t charge by percentage, I charge by the acre or by the hour so it doesn’t matter if they’ve got an acre or 500” (<i>Independent consulting forester</i>)
Working on neighboring properties	“Sometimes the small ones, I’ll combine 3 or 4 of them you know. Usually it was like a subdivision or you know they’re all next to each other. And I’ll combine 2 or 3 or 4 of them to make it worth my while.” (<i>Independent consulting forester</i>)
Expanded range of services	“I’m providing harvesting services to landowners that would ordinarily not fit into the categories of what I would call commercial logging.” (<i>Independent consulting forester</i>)
Investing in small scale harvesting equipment	“I’ve got an older skidder and a little tow-behind trailer with a loader on it and now when I get a call- I have 8 trees, I have 12 trees, I have 40 trees- you know it makes sense where I can design a pick-up truck, move my equipment in and out and cue up the logs at our house or whatever and then sell them from there.” (<i>Independent consulting forester, retired state forester</i>)
Providing specialized services	“I’m probably more unique than most other people, but [landowners] are calling me because they’re looking for a specific goal that they want met.” (<i>Independent consulting forester</i>)
Working with other contractors to help achieve landowner values	“Now I have a fellow that follows the loggers. Anything that is left on the ground or needs to come out, dead trees, damaged trees, that sort of thing, I go in and mark, then he goes in and he manicures the area.” (<i>Independent consulting forester, retired industrial forester</i>)

Orientation of Services to Landowner Values

As landowner objectives move beyond timber production, some foresters are responding by offering different management services (Table 2). Nearly all of the foresters described meeting with landowners in person, usually on their property, to determine their long-term goals and objectives for their forestland. The popularity of non-timber producing forest management activities, such as improving property aesthetics, managing for wildlife, and increasing recreation opportunities, is continuing to grow and dominates small landowner objectives. However, several foresters mentioned that even environmentally-conscious landowners with newly acquired land know very little about the existing resources on their property, what can be done, or even what they want to gain from their forestland. Thus, determining the appropriate management activities for any single property was often described as a time-consuming and challenging process.

Many foresters described projects focused on improving property aesthetics for small forest owners, especially for those who had purchased forest properties as a

location for their primary or secondary residence. Aesthetic-enhancing services included cutting individual trees near residences, harvesting to create scenic views, thinning forested areas near residences to allow more light into the area, and removing trees and brush from the forest perimeter to allow owners to look into the woods. Even in the case of traditional timber harvesting services, respondents pointed out that on smaller properties with residences nearby, it is necessary to consider aesthetics when planning harvesting activities. Foresters noted that this can be a major challenge since most harvesting projects are not aesthetically pleasing, especially at first. Several interviewees explained that they made an effort to ask logging contractors to keep their equipment and landings clean and professional looking when working on small properties, and two mentioned that they went so far as to go back after timber cutting to “manicure” areas to make them more park-like in appearance. However, they and others pointed out that unsustainable forestry practices could also be very neat in appearance and strongly cautioned that any efforts to maintain or improve forest aesthetics should be subordinate to sustainable forestry principles.

The majority of foresters noted continued interest by small property owners in increasing wildlife populations, from deer and grouse for hunting to interior forest songbirds for bird-watching. They described their own conscious efforts to link management practices to these interests. In efforts to maintain or increase the number of these animals, foresters incorporate a range of activities that include creating forest openings, diversifying habitat types, creating early successional habitat for bird and small mammal cover, creating and leaving snag or drumming trees for woodpeckers and grouse, and leaving coarse woody debris on the ground to provide cover for a variety of small mammals.

Another major set of management services that foresters are offering to owners of smaller parcels involve increasing recreational opportunities for individual and family use. The most common is creation of trails and trail systems that the landowners can use for walking, snow-shoeing, cross-country skiing, 4-wheeling, and horse riding, often incorporating and extending skid trails used for harvesting equipment access. Several foresters also mentioned creating open shooting areas and managing for mature sugar maples for small-scale syrup production. While these projects have not been unusual for larger landowners in the past, there is a noted increase in smaller property owners requesting these improvements as their primary motivation for initiating management activities.

Many interviewees were optimistic about their ability to provide expanded services appropriate for small forest parcels. Some respondents were pursuing coursework and certifications in order to increase their ability to engage landowners in concepts like forest sustainability and management for wildlife diversity. Others use global information systems (GIS) and remote sensing to create personalized maps for landowners. Nonetheless, despite growing landowner interest in objectives beyond maximizing timber income, the majority of projects that interviewees described still centered on harvesting and timber improvement. Most foresters acknowledged that small landowners are unlikely to invest much money into management of their forest properties and foresters that did engage small property projects usually felt that they needed to incorporate harvesting activities to provide

some revenue or support for the costs of other management activities. This revenue could come from harvesting some timber or firewood for sale, and several foresters expressed optimism about growing markets for biofuels as a way to increase revenue from small properties and offset the costs of other management activities.

Changes in Forester Capacity to Work on Small Woodlots

In addition to offering a wider range of services, some foresters are adapting to handle a greater number of small forest properties by increasing their own capacity to conduct forest management projects on smaller scales (Table 3). They described a variety of strategies, including adopting new payment methods for services, working with neighboring landowners, investing in harvesting equipment to expand the roles they can fill in a project, and working with other specialized contractors.

Most foresters said that they had made simple structural changes to their businesses practices to make it more economical to work on parcelized properties. As jobs become smaller, many foresters have switched to charging a flat fee for services or an hourly rate rather than a percentage commission on timber sales. This allows them to be less focused on maximizing revenue from timber harvesting projects and to take on more small projects, provided that landowners are willing to pay for them.

Several interviewees had tried involving neighboring properties in their projects which theoretically increases timber volume, reduces access difficulties, and minimizes travel time for the foresters and logging contractors. However, respondents indicated that many of these partnerships arose from neighbors observing timber harvesting operations and expressing interest in joining the project, rather than the forester directly approaching neighbors ahead of time. In fact, several foresters expressed reluctance to work with neighbors due to managing access issues and expectations. These evaluations indicate that while some foresters are willing to coordinate projects involving adjacent landowners, very few are actively seeking them out in order to overcome challenges created by smaller property size and economies of scale.

A more popular set of strategies involve investment in additional equipment and skills that allow individual foresters to carry out a diversity of activities on small properties beyond the traditional consulting role. Several of the independent consultants interviewed had recently purchased small-scale harvesting equipment or were considering doing so in the near future. These capital investments included small tractors and skidders, small log-loaders and feller bunchers, all-terrain vehicles, and trailers that allowed them to carry out projects harvesting and moving small amounts of timber. This permits the foresters to fill the harvesting role on smaller properties and several mentioned that these types of combination consulting-harvesting projects would continue to gain importance as the availability of logging contractors interested in working on small properties declines. A very small number of foresters described overcoming the lack of contractors by providing landowners themselves the opportunity to be involved in conducting certain management activities such as thinning previously marked trees, harvesting firewood for sale or personal consumption, or even harvesting sawtimber for

personal use. They cautioned, however, that landowner involvement was only an acceptable option if the landowners had the proper knowledge, training, and equipment; a rarity in the growing population of second-home owners and suburbanites. More commonly, foresters said that they were the ones taking on the roles left open by logging and other contractors. As one forester explained,

With the markets the way they are right now I'm kind of a jack-of-all-trades. But I like to say I'm a logger that does forestry, a little consulting, a small amount of tree work and small amount of excavation. You know, I'm not afraid to work and to do different things. (Independent consulting forester)

In contrast to developing a more diverse set of individual capacities, an alternative strategy was to become more specialized and to work in combination with other professionals to achieve the goals of small projects. Foresters working for industrial or large consulting firms already had specialized personnel to perform roles such as technological assistance, accounting, and marketing, so numerous small jobs are not as logistically burdensome. These firms had in-house or regularly contracted harvesting equipment and personnel capable of performing small projects. Several independent consulting foresters also described collaboration with other trusted contractors in order to help them better achieve landowner objectives. A few mentioned regularly working with a specific set of logging contractors who used smaller equipment in order to perform projects on smaller properties that required more "finesse". Others mentioned hiring contractors to come behind harvesters to remove tree tops and branches in order to provide slightly more income to landowners through firewood sales and the aesthetic appearance they desired. One forester mentioned working with professional wildlife biologists to create management plans oriented towards creating more suitable habitat, while another focused his own activities nearly exclusively on wildlife habitat improvement and left others to handle aspects of projects beyond that scope. Relationships such as these allow independent foresters to better achieve landowner objectives and take on projects at multiple scales that might have otherwise been outside their abilities. However, this strategy remains dependent on the continued demand for specific services and the availability of other specialized service providers.

Despite this list of promising adaptations made by some of the respondents, most of the older foresters (over 50 years old) indicated that they had not made any changes to their capacity to work on smaller properties or attract small-property clients. Most of these individuals had retired from other jobs. They expressed reluctance to invest in new equipment due to cost and financial risk. While some continued to advertise in landowner magazine publications, none had pursued mail or internet advertising. This group was also more reluctant to use digital mapping tools, and none of them described novel relationships with contractors. Though they showed few signs of adapting, none expressed concerns about a shortage of projects to fulfill their time and financial needs. They remained involved in varied projects ranging from only a few dozen acres to several hundred relying almost exclusively on previously established networks of relationships developed with landowners and other foresters who provide word-of-mouth referrals. This disinclination to expand commercial activities to smaller parcels indicates that the onus is on the next

generation of foresters to pursue strategies for developing and pursuing new niches for forestry to engage the increasing number of small forest properties.

Discussion

The use of a qualitative methodology allowed us to approach the question of forester perceptions of and reactions to parcelization with as few preconceived notions as possible about what would be found. Both the nature of inductive methods and state-specific property dynamics make it difficult to estimate the extent of the population to which the results are generalizable. However, the approach revealed several important phenomena regarding the adaptations of foresters for work on small-scale forest management projects.

Our study indicated general agreement by professional foresters that forest parcelization is occurring, but more varied opinions about the extent to which the process is affecting their practices. Although many believed that forest parcelization has slowed in recent years, it is still regarded as a major issue for forestry across the state. In addition to decreasing property size, interviewees also described landowner values changing in conjunction with parcelization, primarily the increase in new landowners with less knowledge about forest management and a more varied set of management interests. Few foresters viewed parcelization as the greatest challenge to sustainable forest production; most were more concerned about dwindling markets for wood products, increasingly tight profit margins due to fuel costs and regulations, the high-grading of valuable timber species, and biological threats posed by invasive species and large deer populations. However, these more pressing concerns are often related, at least indirectly, to parcelization. For example, when properties drop below the 50-acre threshold to qualify for state incentive programs, owners feel more pressure to high-grade their forests.

Many independent foresters indicated that they were taking steps to adapt their business practices for projects on small properties, primarily through changes in orientation of services and capacity to carry out these small-scale projects. There were two distinct pathways: becoming more specialized and relying more on contractors for other aspects of management activities, or individually offering a wider range of services to small landowners. These correspond to two strategies for small business survival (Nooteboom 1994): the focus on niche markets or addition of new products and services. Innovation in either direction helps to overcome some of the weaknesses of small business.

The direction of these changes appeared strongly linked to the organizational structure of foresters' employment. Foresters working for larger consulting firms tended to be more specialized individually, while the firm offered more services overall. Public and industrial foresters also tended to be more specialized in designing management plans and directing timber harvesting operations. Independent foresters seemed to move in either direction, probably due to their flexibility and autonomy (Lumpkin and Dess 1996), while a few had made no changes to their business practices at all. Independence allowed entrepreneurial foresters to create competitive advantages by setting their own business goals and methods of

production (Keeble 1992). This allowed them to provide tailored services to landowners and to undertake specialized projects that required flexibility in communication, payment structure, contracting, or equipment. This “nimbleness” of business practices that Hillman (2003) discusses may allow entrepreneurial foresters to work in a parcelizing landscape and adapt their practices to fit the changes in the landscape as well as the changing needs of landowners.

However, there were major differences in approach within the group of independent foresters. Several of the younger foresters expressed frustration at the difficulty of making a living in forestry and were doing more to invest in new small-scale technology and equipment, providing a wider range of services, and experimenting with advertising techniques in order to find new clients and establish their businesses. Others were narrowing their practices to focus on more specific landowner objectives such as wildlife and aesthetics. In several cases older independent foresters described more flexibility to take on small projects, while others expressed reluctance at taking on the risks and new strategies required to adapt to changing conditions at the end of their career. These differences correspond to the distinction found between the adoption of entrepreneurial orientations by older and younger firms showed by Runyan et al. (2008).

While most foresters recognized the threats of parcelization and acknowledged a personal desire to modify their business strategies, many felt that their ability to adapt for more small-scale forestry projects was limited. This is mirrors similar perceptions of European foresters recently documented by Hokajdrvi et al. (2011). Some of these barriers were structural; small-scale forestry projects that rely on traditional divisions of labor between foresters and harvesting contractors require contractors and equipment suitable to implement management recommendations on small forest tracts. However, many public and private foresters mentioned the challenge of finding these contractors, as predicted by Hull et al. (2004). While some foresters in New York have increased their capacity to work on small woodlots by investing in their own small-scale harvesting equipment, many expressed reluctance about taking on additional financial burdens and risk.

Other barriers to small-scale projects may be related more to the characteristics of foresters' employment. State foresters described their mandate to work with properties enrolled in the state tax incentive program, so smaller properties are less of a priority. Several independent consulting foresters we spoke to were retired from positions in industry or public agencies, or were currently working in other non-consulting jobs. They have continued their forestry involvement with private landowners primarily as an extension of their personal commitment to sustainable forest management rather than as a means of generating maximum income. However, none of these foresters expressed an overt bias against taking on small projects, a concern of Hull et al. (2004).

Overall, it appears that a contingent of New York foresters are considering forest management orientations beyond traditional timber production and shifting away from payment tied only to the value of harvested timber. However, while some foresters may be adopting new practices, they do not appear to be shifting to the extent of entrepreneurial forestry-service providers in other geographic areas (e.g. Hull and Nelson 2011). This raises concerns that their efforts may not be sufficient

for reaching the expanding number of new forest owners and that less forest acreage is being professionally managed overall as smaller projects fill the dockets of consultants.

Conclusions

The future management of US forested landscapes is highly dependent on the actions of an increasing number of small private landowners. While there are many services that professional foresters can offer to increase the health and value of these forests, shifting ownership conditions will require them to go beyond traditional timber production techniques to appeal to new owners with smaller properties. Our interviews suggest that foresters working with New York private landowners have begun making a number of changes in their service orientation and capacity, but that these changes have not been universal.

As forest parcelization continues, it may force more foresters to develop entrepreneurial positions for the survival of their small businesses or join larger firms that can take more financial risks and offer a wider range of services. In other systems that encounter major instability, actors are pulled in different directions and as these adaptations accumulate, radical, system-wide changes can result (e.g. Plowman et al. 2007). If forest parcelization reaches this level it might dramatically divide consulting forester operations in their practices and approaches. Furthermore, foresters who are unable to find ways of adapting their services to smaller properties may find it increasingly difficult to maintain their business and avoid unsustainable management projects.

As parcelization across forested landscapes continues, it will become increasingly vital for policy makers, educators, and conservation professionals to support sustainable management on small forest properties by encouraging forester innovation. There is a need to broaden forester capacity through training and certification, to increase the pool of contractors capable of small-scale projects, to encourage cooperation between landowners, and to provide incentives for new property owners and small property owners to become engaged in forest management. Further research building on this study might examine the long-term viability and forest health outcomes of amenity-based and harvest-based forest management, investigate the benefits of forestry assistance to small property owners, or explore the barriers to entrepreneurial strategy adoption by foresters. We hope that the qualitative findings from this study help inform broader assessments of the changes in forestry, especially as policymakers, professionals in the forest industry, and landowners in many regions face the long-term challenges created by ongoing forest parcelization.

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